

Tape Manual



BASF



Panoramic view of part of the BASF Factory, which extends for four miles along the bank of the Rhine

**A
Comprehensive
Booklet
on**



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An Old Dream Come True

It seems that we are living in an age in which practically every dream comes true. At no time in the past have so many scientific discoveries and inventions changed our way of life and the face of the world. Yes, we live in the age of science! Maybe we are forgetting to be awed, or are we so used to acquainting ourselves with the new that we seem to take anything for granted nowadays?

One of the oldest dream of mankind is to retain a fleeting sensation. During the centuries gone by, man applied himself to make this dream come true. Works of art were created, and edifices were constructed. These were intended to withstand the ravages of time and to be handed down to posterity.

However, one of the most fleeting sensations of all—sound—has until recently always evaded capture.

Our forefathers, being past masters in captivating optical impressions, have handed down their impressions of former times in the form of great works of art. Architecture and household utensils are silent witnesses to their way of life and customs. But, no spoken word, and no music from the ages gone by!

Although their written words can communicate thoughts to us, they cannot convey the atmosphere of the spoken word.

There are many century-old manuscripts by great composers, but we can never hear Johann Sebastian Bach's rendering of an organ recital, Toscanini's playing the violin, nor the voice of Chaliapin—sounds and music that enchanted audiences in the past.

The desire to captivate sound has taken longer to realize than other wishes—just as old—of retaining a fleeting sensation. Optical impressions remain for much longer periods. Organs of Bach's age still exist, and our visual impression of them would differ in no way from that of Bach

himself. The sound that once rang in Bach's ears has long since died just as the new chord that we might strike would die within a very short time. The chords could certainly be struck again, but, although they would sound similar to the original chords, they would never be the same.

If we buy flowers to decorate our home, we do this in the hope that they will keep their beauty for at least a few days. Skilled woodworkers, sculptors, and architects can expect their work and creations to live for centuries. Singers, musicians, orators, and we ourselves, how long can we expect to be remembered?

Thanks to science and modern technology, we now possess a means of capturing sound. The multitude of different impressions in the acoustic world that are just as beautiful and gratifying as those of the visible world can now be conserved for all posterity.

The ingenious instrument used for this is magnetic recording tape. At home today, tape recordings are bringing us the finest music ever; in the factory, giant machines are being controlled from a mysterious little reddish-brown ribbon; and television studios are now recording both pictures and sound on tapes. What is this magic tape that practically does everything from writing out cheques to guiding missiles in space? Before we discuss further achievements of this new recording medium, we will give you a short account of its history.

A Short Outline of the History of Magnetic Recording



Like a baby, every invention has its teething troubles before reaching maturity.

We all know that Thomas Alva Edison invented the phonograph from which our modern gramophones were developed; we know that the sound for talkies is produced by light-beams, but what do we know of the invention of the magnetic recording process?

Oberlin Smith first described the principle of magnetic recording in the American journal "The Electrical World" as far back as 1888. As usual, the article created hardly any interest, because neither results of experiments nor even a laboratory were available for a demonstration.

Ten years later, in 1898, Valdemar Poulsen, a Danish engineer, developed the first serviceable magnetic recording machine that employed a steel wire as the sound carrier, and named his invention the "Telegraphone". This machine was a sensation at the Paris exhibition in 1900. And yet, it met with failure, since by modern standards, it was very crude indeed.

In 1928, Fritz Pfeleumer applied for and was granted a German patent for coating a paper tape with magnetizable pulverized iron particles. This was the start of the actual development of magnetic tape recording.

The electrical industry, viz. AEG, was of the opinion that Pfeleumer's invention could be applied in practice by the chemical industry, and requested the IG Farbenindustrie, Werk Ludwigshafen, the present BASF, to develop this idea. The AEG initiated research on tape recording equipment in 1932 and the BASF on the tape bases. This joint research culminated in the production of the first practical tape recorder. In 1934, BASF Ludwigshafen produced the first 55,000 yards of magnetic recording tape for the Berlin Radio Fair, and in 1936 magnetic recording tape made its debut in the music world with the first magnetic recording ever to be made of a concert which was given by the London Philharmonic Orchestra with Sir Thomas Beecham conducting in Ludwigshafen am Rhein.

In 1940, the process of recording was decisively improved by H. J. von Braunmühl and W. Weber's high frequency bias pre-magnetization.

1944 was another year of improvement for magnetic recording tape—the IG Farbenindustrie AG, Werk Ludwigshafen, replaced the cellulose acetate backing with ©LUVITHERM, an unplasticized polyvinyl chloride film.

1950 was the year in which the technique of magnetic recording was made available to everyone. The science of sound recording was no longer restricted to professional sound engineers and broadcasting studios.

Now is the time where new developments follow in quick succession. Amateurs and industry alike are continually discovering new fields of application. Magnetic recording tape is finding its way into private homes; and is enabling new labour saving methods to be applied in industry, science, research, and in technology.

In order to understand this complex and new sound recording technique, we must have some knowledge of sound itself:



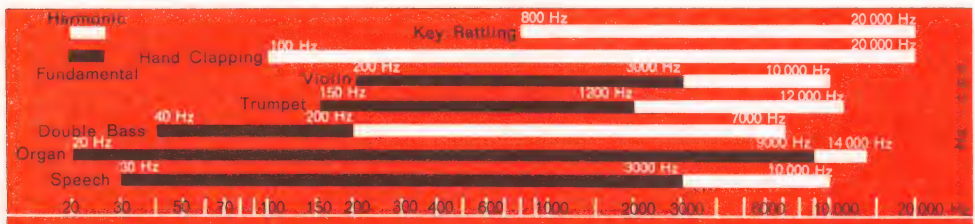
What is Sound?

When you want to convey your ideas to another person and open your mouth to speak, does sound emanate from your mouth?

Well, yes and no.

The basic substance of sound is, a zone of compression and rarefaction of air. This manifests itself, e.g. when a shot is fired from a gun. The resultant pressure wave reaches out in all directions at a speed of about 1,100 feet per second, and arrives at our ears—as sound. If these pressure variations follow each other in quick succession, a certain point is reached at which our ear cannot distinguish the variations separately, and receives these successive impulses as a tone having a constant pitch. The number of these variations per second is known as the frequency and is measured in cycles per second. We can only hear frequencies ranging from about 16 to 16,000 c.p.s. Below 16 c.p.s. our ears pick up the oscillations as separate impulses. Above 16,000 c.p.s., our ears fail to follow the oscillations or the quick succession of the pressure variations at all. We call these the ultra-sonic frequencies, which many animals can still perceive and which serve us human beings in various fields, such as in medicine. Low tones have relatively few oscillations and are thus called low frequencies and high tones have many oscillations and are thus called high frequencies. Human speech generally covers the frequency range from 30 to 4,000 c.p.s. Of course, there are individual variations. The frequency range of the different musical instruments also vary greatly as shown in our graph.

Frequency Range of Speech, Music and some other sound sources





Everything we can hear as speech or music we call sound, but this is actually a complex mixture of individual tones which are composed of a basic tone and several harmonics. The basic tone determines the pitch of the sound, whereas the harmonics, which are also called overtones, convey to us the characteristic of the source and helps us to determine the difference between, say, a piano and a cello or a violin and a guitar. Therefore, if we wish to record and play back sound as true to life as possible, our recording equipment must be able to pick up and play back the full range of frequencies audible to the human ear. This can be achieved with

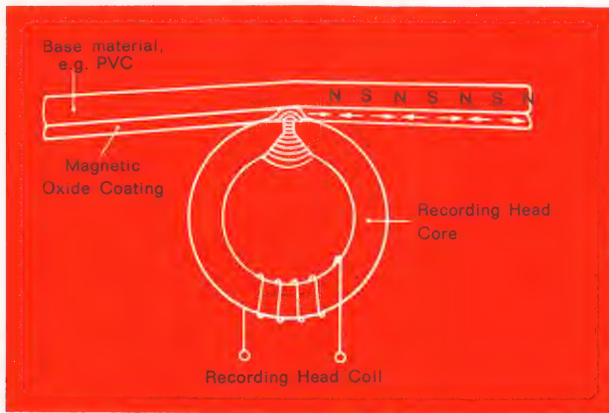
Magnetic Sound Recording

According to electronic engineers, the principle is quite simple.

Our tape recorders are equipped with an electro-magnet consisting of a coil of wire on an iron core, which has an extremely thin air-gap. This electro-magnet is called the "head", with which sound can be recorded, played back, and erased. Many recorders employ one and the same head for the recording and the play-back process.



Obviously, sound cannot be simply "picked up" (as our cartoonist has illustrated). It first has to be picked up by a microphone which translates the physical sound into electrical audio frequency oscillations. The oscillations are then amplified and fed to the recording head coil. A magnetic field, the intensity of which varies synchronously to the sound waves, develops across the head gap, past which



the coated side of the tape carrying the magnetizable particles is guided as closely as possible at a constant speed. The particles are permanently magnetized and the original sound waves thus reproduced on the tape as individual magnetic fields.

The intensity variation of the magnetization on the tape is a true replica of the original sound waves. However, in order to obtain a recording that is distortion-free and as true to life as possible, the tape must first be pre-magnetized with a high frequency bias current.

This high frequency bias, which is also called ultra-sonic bias, is produced by passing an alternating current with a very high frequency through the windings of the recording head

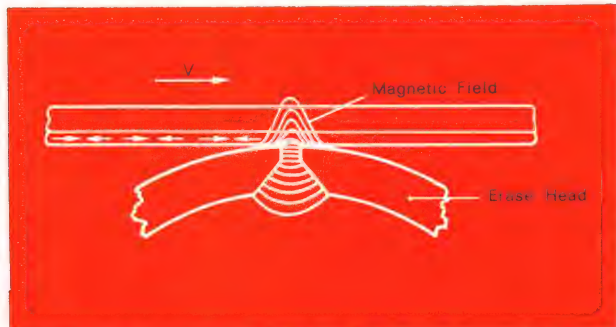
coil. This alternating current usually has a frequency of 40,000 to 80,000 c. p. s. so that it is not recorded on the tape itself.

The reproduction process is actually the reverse of the recording process. The tape must pass the play-back head gap at the same speed at which it was recorded. As the individual magnetic fields pass the play-back head gap, the magnetic flux in the head changes synchronously and induces an alternating voltage in the coil. This voltage is amplified by the play-back amplifier and fed to the loud-speaker. The loud-speaker translates the electrical impulses into sound waves.

Now, is it as simple as the engineers claim? There are many complex actions involved in the sober technical term "varying magnetization". It is of some comfort to know that one does not need to understand the intricate technical actions of the magnetization process in order to enjoy a good recording.

Our magnetic recording tape has two invaluable properties for the amateur recordist.

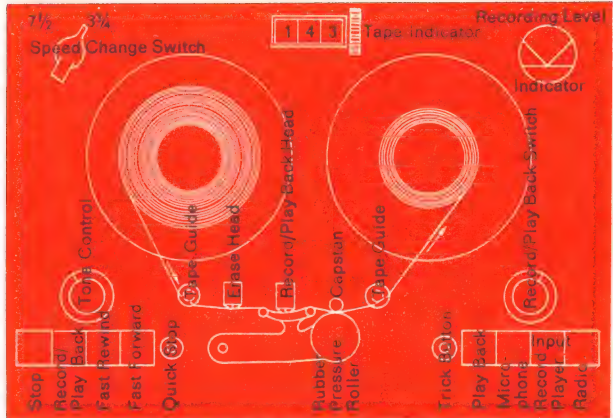
—Firstly, the quality of the recording never deteriorates, because the tape does not wear out and can be played back as often as desired.



—Secondly, all recordings can be erased anytime. The tape is simply de-magnetized. This is the job of the erasing head, and is accomplished automatically before each new recording. The tape passes through a magnetic field induced by an ultra-sonic alternating current that is passed through the windings of the erasing head coil. This action de-magnetizes the tape and the original recording disappears. To obtain a better idea of this de-magnetizing or erasing process, simply imagine that after having drawn some figures in the sand, you smooth out the surface and write something else on the same spot a second time. The miracle of recording sound that can be stored permanently, played back as often as desired, or even erased, is performed by the



The Tape Recorder



An instrument which transforms acoustic sound waves to variations of magnetic field intensity, and translates them back to the original sound waves. It might interest you to learn more of this amazing process. At a quiz programme, the intimidated candidate often begins something like this: "The family of the worms can be classified into nine-hundred-and-ninety-thousand groups . . ." We are luckier than this poor candidate when we discuss tape recorders. It "only" has two main units—one **mechanical** and one **electronic**, although both of them are certainly complicated enough. The **mechanical** section is called simply the tape-drive mechanism and has the job of winding and unwinding the tape and transporting it at a precisely controlled rate of speed past the recording, play-back, and erasing heads, and then accumulating or re-reeling it after the recording or play-back process has been completed. The minutest variation of this speed on recording or playing back is noticeable in the form of an objectionable howling sound or a fluctuating noise, also called "wow and flutter". The tape-drive mechanism also accomplishes high-speed rewinding of the tape, as we cannot wait for hours on end



to reach a certain spot in the recording or to record some other programme on a different track. The part of the mechanical system that maintains a constant tape speed is called the capstan. The tape comes in pressure contact with this capstan, which is usually a revolving shaft. The diameter of this shaft controls the rate at which the tape passes over the heads.

Many home tape recorders are equipped with only one motor with a constant speed. This single motor powers a number of functions, such as driving the capstan, supplying the power for the tape take-up either to the right or the left reel as the case may be, as well as supplying the power for the high speed rewind.

The capstan is driven either directly by the motor or indirectly by a belt-drive system. The power for the tape take-up is provided by a slipping clutch to attain a constant torque and tape tension. On high-speed rewind, the pressure on the tape at the capstan is released and thus the tape is free to travel at a very high speed in either of two directions. A set of tape guide posts are usually placed on either side of the head so that the height of the tape is kept at the same level to ensure consistent alignment with the magnetic heads during recording and play-back. In order to ensure intimate contact between the tape and the recording or pick-up heads, some systems are provided with pressure fingers and pressure pads, and others with special convolutions of the tape path which exerts gentle pressure of the tape on the heads by its own torque.

Most recorders are equipped with programme selectors or tape counters which indicate the beginning of a special piece of music or a particular spot in dictation. These counters are coupled to the shaft of the take-up reels and therefore indicate only the revolutions of the reel and not the footage of the tape itself or the playing time. However, these indicators are accurate enough to find any desired spot on the tape, provided that the same size reels were employed both in the recording and the play-back process. Most tape recorders have been constructed with a view

to simplicity of operation and are provided with switches or press buttons. All functions such as "Record", "Play-Back", "Start", "Stop", etc., are controlled by the well-known "Push Button Method". And to ensure that no mistakes can be made, each function can be switched on only after the mechanism has come to a complete stop.

All modern recorders are also equipped with a "Quick-Stop" button which immediately stops the tape transport. This button releases the pressure on the tape at the capstan and, at the same time, activates the breaking mechanism. This button can be locked for long periods when depressed, but this should be avoided during recording.

The second unit of the recorder, which is the **electronic** component, consists of an amplifier for the recording and reproducing process, a recording level indicator, and an oscillator circuit which produces the high frequency current for the ultrasonic bias and the erasure.

Owing to physical factors involved in the magnetic recording process, the low and high frequencies are attenuated with respect to the medium frequencies. The amplifier is provided with an equalizing circuit which compensates the high and low frequency losses both during the recording as well as during the play-back, so that all frequencies are reproduced by the recorder as close to the original as possible. Engineers call this condition a "flat overall frequency response". International standards prescribe the degree of equalization in order to ensure interchangeability of tape recordings.

The electronic component is also operated by means of switches or press buttons. Almost all recorders are equipped with several input terminals for recording. Smaller recorders have at least two such input terminals, one of which is for the microphone. More elaborate sets have a self-contained mixer unit with which several sources can be blended in as desired.

After depressing the "Record" button, the only thing one has to do is to see that the recording is being made at the proper level, or in other words (although, technically speaking,

not quite correct) to see that the tone placed on the tape is neither too loud nor too soft. The engineer would say: "The current supplied to the recording head must be adjusted to the correct value." If this current is too high, the recording is badly distorted, and if it is too low, the recording has to be amplified to such an extent that a poor signal-to-noise ratio will result on play-back. A correct and good recording is ensured if the loudest signal is just below the maximum recording level. As most recorders are provided with a recording indicator, usually a magic eye, the adjustment of the recording level is not very difficult. The loudest signal occurring in a recording should, in extreme cases, just close the two beams of the magic eye, but the beams should not overlap as this indicates that the recording is distorted. With a bit of practice and some experience, perfect results will be obtained in every case. If necessary, a trial adjustment before the actual "take" will ensure that the recording will be a success.

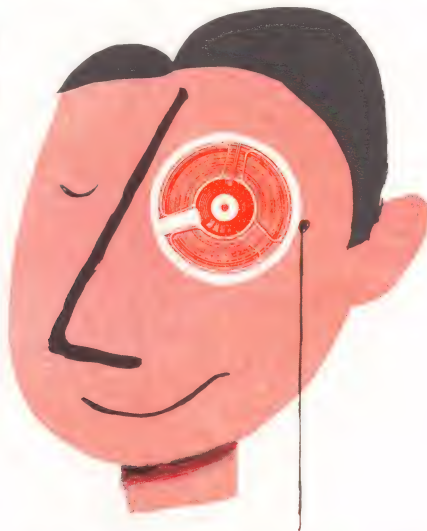
For special effects, such as blending in a second recording without erasing the original, many recorders are provided with a trick button. When this button is depressed, it cuts off the erasing head during recording. Thus, the second recording is superimposed on the original, such as a commentary together with some back-ground music (a trick frequently employed in adding sound to home movies). This "mixing", of course, reduces the recording level of the original recording slightly, but, if this effect is not desired, it can be compensated by recording the original track at a higher level.

In addition to the volume control, most recorders are equipped with a tone control with which the colouration of the sound can be adjusted to satisfy individual tastes. Some people feel that the high-pitched sound of a violin is too shrill while others object to the booming of the bass. The tone-control circuit boosts or cuts either the high or the low tones as desired to satisfy different tastes.

In many cases, the quality of a good recording can be greatly improved by employing the loud-speaker of a radio for the

reproduction rather than the small loud-speaker of the recorder. To accomplish this, most recorders are provided with connections adapted to transfer the output signal to the radio set. If a recording is to be made of a radio programme and the set is equipped only with connections for an external loudspeaker and a gramophone, it is advisable to have a diode coupling built in. The signal from this diode coupling has much better quality than that from the output of a loud-speaker. The extra cost involved is quite small and the output signal is not affected by the tone or volume controls nor by the equalizing circuit of the audio amplifier of the radio set. Furthermore, the signal from the diode coupling contains practically all frequencies that are received from the broadcasting studios and is quite independent from the loud-speaker of the radio set, so that it is possible to control the radio volume independently for monitoring, without affecting the recording level. In fact, the radio may be silenced during recording, whilst the proper recording level is maintained by observing the magic eye. Even the best and most expensive tape recorder obtainable will not perform without the magnetic recording tape. It is the

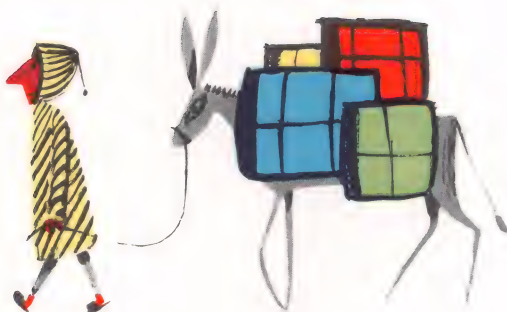
Heart of the whole Process



The recording tape is the criterion for the quality of the recording itself. No recorder can be expected to give good performance with a poor quality tape. The excellent tonal

quality of home recorders with low tape speeds and two- or four-track recordings was made possible only by the immense improvement of the mechanical and electro-acoustical properties of modern tape materials. Right from the beginning there was no problem in manufacturing recorders with low tape speeds, but such recorders were useless until a tape had been designed with which it was possible to make excellent high-fidelity recordings at such low tape speeds.

Some comments on this "wonder" tape are worth mentioning. First of all, let us discuss the plastic backing material which is



The "Carrier"

of the magnetizable particles. This backing material determines the mechanical properties of the tape. The demands placed on the backing material of magnetic recording

tape are considerable. It must be extremely thin and supple, in order to ensure very close contact with the magnetic heads as perfect magnetic contact is of utmost importance, but at the same time, it must be a material of considerable strength. Although the stresses imposed during recording and reproduction are not very great, enormous loads are incurred during re-reeling, sudden starts, and stops. The backing material must withstand these shock loads without deformation or breaks. Furthermore, the tape must not be affected by humidity and high temperatures.

BASF MAGNETIC RECORDING TAPE certainly fulfils all these requirements. Badische Anilin- & Soda-Fabrik AG was not only the first to develop magnetic recording tape, but they have constantly endeavoured to improve this "wonder" tape. BASF, pioneers of magnetic recording tape manufacture, is one of the most important chemical concerns in Europe, and is actually a city of chemical science, with streets bearing the names of its great achievements, such as Alizarin Street, Indigo Street, Indanthren Street, Chlorine Street, Ammonia Street, etc. Products of BASF are exported to more than a hundred countries of the world. BASF produces fertilizers, plant protection agents, insecticides, and intermediates for ®PERLON and NYLON production. More than nine million pounds are allocated for research each year, and the BASF laboratories are centres of scientific work. Since 1956, BASF MAGNETIC RECORDING TAPE is produced in one of the most modern manufacturing plants in the world and has been designed, formulated and precision-made in this plant to give you the finest possible high-fidelity reproduction of all sounds throughout the entire audible frequency range. ®LUVITHERM, an unplasticized polyvinyl chloride film, produced solely by BASF, is preferred for use as a backing material. During production, this film undergoes a special pre-stretching treatment which imparts the excellent mechanical properties to the BASF MAGNETIC RECORDING TAPE. ®LUVITHERM has excellent strength and dimensional stability, it is very supple and absolutely resistant to ageing and it is unaffected by humidity and temperature variations.

In addition to ®LUVITHERM, special types of BASF MAGNETIC RECORDING TAPE also use high-strength polyester, a new plastic film that has much greater tear-strength and temperature stability but which is not quite as supple as ®LUVITHERM. These special types are therefore only employed in cases where mechanical or thermal stresses are greater than those involved in normal applications.



Beauty is only Skin Deep

But the powder on the face of BASF MAGNETIC RECORDING TAPE has a serious function. It actually retains the signal and determines the quality of the reproduced tone. The electro-acoustical properties of magnetic recording tapes are governed mainly by the three factors: (a) the magnetic properties of the iron oxide employed, (b) the size and form of the particles, and (c) the distribution of these particles. The quality of the surface of the coating is also of importance. Therefore, in order to determine the quality of magnetic recording tapes, a whole list of properties must be examined,

but owing to space limitations, we cannot become involved in discussions on chemistry, production methods, and explanations of electro-acoustical properties which might interest only the technicians. Let us confine ourselves to the most important points only.

The magnetic coating of BASF MAGNETIC RECORDING TAPE consists of a brown iron oxide which is incorporated into the coating compound in a highly dispersed form. By way of complicated processes, these iron oxide particles are given a form similar to that of gramophone needles. These minute iron oxide needles have a length of approximately $\frac{1}{2}$ micron. This pulverized oxide is incorporated into the coating compound by a protracted grinding method. A highly dispersed suspension, which could be termed magnetic ink, is then applied to the backing film. The coating process is an extremely critical technique and must produce a print of constant thickness on the backing material. High-precision printing machines produce a layer the thickness of which is maintained within an accuracy of ± 0.0000125 ths of an inch! At the same time, the needle-shaped iron oxide particles are magnetically orientated in the lateral direction of the tape. This magnetic orientation improves the electro-acoustical properties. It is most important that the iron oxide employed for the production of BASF MAGNETIC RECORDING TAPE is magnetically stable. This means that the magnetization induced during the recording process does not vary with time or mechanical stresses. This results in unchanging quality of the recording even after storage for decades or when the tape has been used innumerable times.

The coating is then polished and lubricated, thus imparting to the tape a non-abrasive, mirror-smooth surface. This treatment further improves the intimate contact between the tape and the magnetic heads, which in turn improves the high-frequency response. Abrasion effects and drop-out are eliminated and thus wear of the magnetic heads is reduced.

Tailor-Made for Everyone?

Even tailored suits do not fit everyone, but BASF MAGNETIC RECORDING TAPE must be a perfect fit for all recorders.



The dimensions of magnetic tapes are internationally standardized. Their electrical values, technicians call these the electro-acoustical properties, only become apparent when they are used on the recorder.



The Electro-Acoustical Properties

The electro-acoustical properties of a tape cannot be given for the tape alone, because they are influenced by the characteristics of the recorder. The evaluation, therefore, is made by comparing the tape to be tested with a standard reference tape. The results obtained, using the same operating conditions, are compared with the known results of the reference tape.

With these factors in mind, we will attempt to explain the most important electro-acoustical properties.

Sensitivity

This is the measure of the signal intensity obtained from the tape that has been recorded under specific conditions. A high-sensitivity tape retains a stronger magnetization under equal operating conditions. On reproduction, this tape gives a higher output voltage and thus greater volume. A high-sensitivity tape, therefore, requires less play-back amplification thus giving a better signal-to-noise ratio and greater dynamic range on play-back.

Frequency Response

This value shows if the tape can reproduce the high frequencies equally as well as the low. Here also, the value is given in relation to that of the reference tape. Best results are obtained with tapes that have the same frequency response characteristics as those of the reference tape.

Harmonic Distortion

This is the measure of the distortion occurring on play-back. Extraneous harmonics are produced during the recording process. These overtones, which were not present in the



original signal, are given as a percentage of the total recording. Harmonic distortion increases the more the tape is overloaded and becomes objectionable if it exceeds 5 %.

An Undesirable Transfer

The adjacent layers of a tape wound on reels have an undesirable tendency to exchange their magnetism which increases with the length of storage time. The technicians call this effect the "print-through" or the "layer-to-layer signal transfer" and admit that nothing can completely prevent this effect. But, today, it is possible to produce tapes which have such low print-through that it is hardly noticeable. Print-through will be inaudible with BASF MAGNETIC RECORDING TAPE even on long storage, and recordings made on these tapes will be crystal-clear with no echo effects.

Thank You, that's Enough

We can now erase the recording. The erasure is accomplished by using an alternating magnetic field of extremely high frequency. For all practical purposes, this intensive ultrasonic frequency eliminates every trace of the original recording. Of course, the remaining signal of the original recording after erasing can still be measured by means of special techniques and with the aid of super-sensitive equipment, but with a high-quality tape this signal reduction by erasing (a ratio of the original recording to its remainder after erasure), is sufficient to reduce the original recording to a value below that of the noise level.

Another property required for the evaluation of magnetic recording tapes is

The Magnetic Modulation Noise

This noise signal is caused by irregularities in the magnetic coating or impurities and dust on the surface of the tape. It is measured under strict test conditions by recording a direct current on the tape. In the case of BASF MAGNETIC RECORDING TAPE, this modulation noise is so slight that it permits crystal-clear and brilliant true-to-life recordings of all sounds within the audible range.



There are many different makes of home tape recorders available today. They not only vary in outward appearance but also in their construction. A good quality tape must give optimum performance on every one of these recorders and the best possible quality of reproduction. BASF MAGNETIC RECORDING TAPE has been designed, and its electro-acoustical properties carefully balanced, to meet the most exacting requirements in this field. With BASF MAGNETIC RECORDING TAPE, the amateur as well as the professional can realize all the possibilities offered by modern recording systems. A special finishing process imparts a mirror-smooth surface to BASF MAGNETIC RECORDING TAPE so that it meets all demands made on it by the four-track recording system. As the tape-to-head contact is a critical factor in four-track recording, only extremely smooth and supple tapes should be employed with such recorders. Experience has shown that BASF MAGNETIC RECORDING TAPE Type LGS 26 is particularly suitable for four-track recorders. Troublesome drop-out or "blips" are virtually nonexistent with this tape owing to its mirror-smooth surface and excellent suppleness.

The Production

The production of such complicated tapes requires the highest degree of precision. The complex production process can be explained briefly as follows:—
Pulverized polyvinyl chloride (PVC), together with suitable additives, is super-calendered into a plastic film which is subsequently stretched. This plastic film has the trade name ®LUVITHERM.

A dispersion of iron oxide in a lacquer binder is then coated, on to the plastic film on a specially designed coating machine, it then passes over rollers into the drying chamber. The surface of the film is subsequently polished, the uncoated side printed, and the wide roll of film cut to the standard size (6.25 mm, 0.247"). Switch foils and leader tapes are spliced on to the magnetic tape which is then wound on reels and secured with tape clips. The reel of tape is finally packed into ®LUPOLEN*) bags, sealed, and placed in the swivel box.

*) ®LUPOLEN is the trade name for the BASF range of polyethylene. BASF supplies the widest range of polyethylene, from the softest form to the hardest, in Europe.



This is how it is presented to You

Of course, magnetic recording tapes cannot be offered to you in a disorderly heap. (If you have the opportunity to look behind the scenes in a broadcasting studio, you may find such heaps of tape in waste bins or in some corner of the room—it is a lot of fun trying to untangle the mess!) BASF MAGNETIC RECORDING TAPE is supplied in completely dust-proof bags. It is wound on double-flanged plastic reels, with the coating on the inner side. The flanges protect the tape from damage and guide the tape during the

feed and take-up process. The standard reel sizes give the approximate outside diameter of the reels.

The coloured leader tapes, green on one end of the tape and red on the other, indicate the beginning and the end of each tape, and act as additional protection. The leader tapes are threaded into the slot of the empty take-up reel on the recorder. They can also be marked, a reference number or code letters may be written on their surfaces.

A 5-inch silver contact strip has been spliced between the leader and the magnetic recording tape, and makes the contact for stopping the tape transport of recorders provided with an automatic stop.

The small red clips on the reels also serve a good purpose. They anchor the ends of the tapes so that they do not slip off the reel during storage.

The fact that BASF MAGNETIC RECORDING TAPE is packed in a dust-proof, sealed bag is a real assurance that it is completely clean and has never been used.



The red swivel box completes the ideal packaging. The good looking box, which acts as an additional protection, can be placed on a book-shelf one beside the other, and filed just like books. The spine of these cases can be marked with code letters or numbers and can be listed in the BASF MAGNETIC RECORDING TAPE INDEX for easy reference; these booklets are supplied by the BASF free of charge. The sides of the tape holder within the swivel case also provide space to enter details of the recording.

In addition to the practical items described, many other accessories are available:—a white separating tape; coloured leader tapes; a splicing set with a splicing tape and a tape groove; liquid adhesive; a cutter box including every item necessary for the production of a professional splice (this cutter box contains the BASF Tape Splicer); a leader tape set with a number of ready-cut switch foils; non-magnetic scissors; empty cardboard swivel boxes; and empty reels of all sizes.

Help! Which one shall I buy!

The wide variety of tape recorders on the market presents a problem. The prospective recordist will study detailed brochures made up with a lot of interesting pictures and even more technical terms, which all help to increase the desire to buy. Often, as with all nice things in life, the right choice becomes extremely difficult. The only way to tackle this problem is by way of cool analysis:—

What are my requirements, what do I expect my recorder to do, and in what way do the various makes vary?

Usually, the amateur recordist can disregard the large studio recorders employing tape speeds of, say, 76 cm/s (30 i. p. s.) or 38 cm/s (15 i. p. s.). They are only employed by broadcasting and recording studios and have been designed with a view to their needs.

We are mainly interested in home recorders, but in this category a multitude of different makes are offered. There are the inexpensive, simple models (which may nevertheless be well designed and robustly constructed), and there are the de luxe models, intricately designed and very versatile, which must be handled with more care.

Fast or Slow?

The most important question to be decided first is that of the tape speed. It is measured as the speed of travel of the tape in inches during one second, from one reel to the other. The large studio models used in broadcasting studios originally ran at a tape speed of 30 inches per second. Later developments in the field of magnetic tape production enabled the recorder industry to cut this speed considerably. Modern home recorders have tape speeds of $7\frac{1}{2}$, $3\frac{3}{4}$, $1\frac{7}{8}$, and $\frac{15}{16}$ inches per second. Some models even have three tape speeds.

The ideal and most popular tape speed is $3\frac{3}{4}$ i. p. s. The frequency response at this speed is excellent and the amount of tape required is held within reasonable limits. At $1\frac{7}{8}$ i. p. s., the loss of high frequencies must be taken into account. Although speech can be very satisfactorily recorded at this slow speed, music lovers who wish to record in high-fidelity will not be satisfied with the frequency response*).

$1\frac{7}{8}$ i. p. s. is ideal for, adding sound to slides and home movies, where the back-ground music has only a secondary importance.

*) Some newly developed home recorders have an extended frequency range and will give Hi-Fi reproduction even at this low speed. These modern systems can therefore be used for music reproduction.

Speeds as slow as $15/16$ i. p. s. are only suitable for lengthy dictation or for the recording of conferences, where the main factor is a very long recording time without interruption. If you wish to record music in high-fidelity and an extended dynamic range, your choice will be a model with a tape speed of $7\frac{1}{2}$ i. p. s. In addition to the high quality recordings, this speed will also facilitate editing. Naturally, more tape is required for recordings at this speed, but Hi-Fi recorders are provided with space for larger reels, better quality loud-speakers, Hi-Fi amplifiers, etc., to give you the best possible reproduction of music.

The tape speed mainly governs the frequency response. In general, the highest frequency reproduced by modern recorders at $7\frac{1}{2}$ i. p. s. is approximately 20,000 c. p. s., at $3\frac{3}{4}$ i. p. s. up to 16,000 c. p. s., at $1\frac{7}{8}$ i. p. s. up to 8,000 c. p. s., and at $15/16$ i. p. s. up to 4,000 c. p. s.

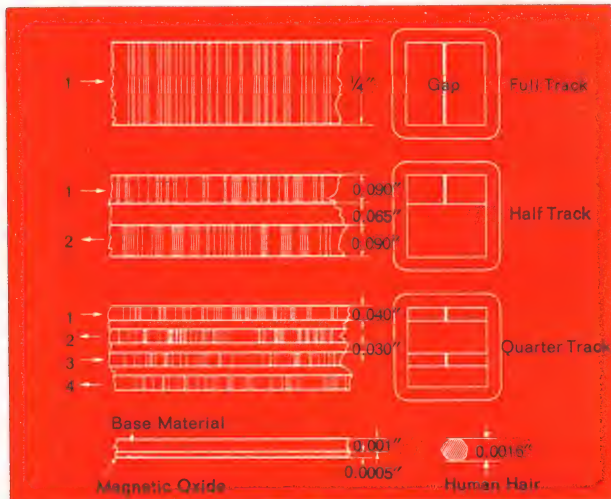
Two or Four-Track?

The terms "two-track" and "four-track" are often quoted in many brochures. Amateur recordists are split into two opposing camps on this question. Some are advocates of the good old two-track, and others are for the newer four-track method. The first group insists upon the fact that the two-track system definitely has better tone quality with greater dynamic range, while the second group can hear no difference in the quality of reproduction between the two methods. We will refrain from taking any side in the argument. Only one thing is certain: The four-track system places increased demands upon the recording tape, and it must be extremely supple, absolutely clean, and have a mirror-smooth, specially-treated surface.

The different number of tracks were developed, just as the different speeds, to achieve a way of economizing on tape. Broadcasting and recording studios usually employ machines with full-track. This track was halved for home recorders

resulting in an upper and lower track. This is done by recording on only half the width of the tape. To use the lower track, the two reels are interchanged, turned over, and recorded over the entire length a second time. The track width of the two-track system is approximately 90 mils each track. Recorders which were developed in 1959 have halved the tracks once more, and the tape is thus used for four tracks of approximately 40 mils width each track. This system has quadrupled the playing time of one tape, but obviously, with such extremely narrow tracks, every particle of dust will be noticeable as a fault in the recording. These particles, although some may be so small that they can hardly be distinguished with the naked eye, will lift the tape away from the head sufficiently to cause a distortion in the reproduced sound. We already know from the foregoing paragraphs that this loss in tape-to-head contact results in drop-out. BASF MAGNETIC RECORDING TAPE will give faultless recordings if they are kept completely clean.

Tracks used on Recording Tape



Dictation on Tape

Although every recorder can be used for dictation purposes, special models have been designed with a view to simplicity of operation in offices for this particular application. Such dictation-transcription machines provide remote-control switches on the microphone to offer the person dictating full remote control of (a) instantaneous start-stop (so as to avoid syllable slurring), (b) play-back-record to enable simple switching from Listen to Dictate, and (c) remote control back-space to listen to previously dictated material. The user can thus concentrate as much as possible on the dictation. The quality of the tone for dictation is of secondary importance provided the model is only needed for speech, but if intended to serve a dual purpose, such as the combined dictation-transcription and home recorder then it could have several tape speeds with requisite Hi-Fi speakers and other components for music reproduction.



Three-Dimensional Sound

Stereophonic recordings with their three-dimensional acoustic effects are now possible with stereo recorders. These effects can be achieved with a two-channel recording system utilizing two microphones. The signals from both microphones are recorded separately on two tracks which are then played back through two separate sets of amplifiers and loudspeakers. As sound travels at a constant speed, two microphones set up at a distance away from each other pick up the sound originating from displaced sources, say, two musical instruments, at different time intervals (phase difference). If these two signals are reproduced by two loudspeakers, set up in the same manner as the microphones, a sensation of equivalent spacial distribution of the original sources of sound is maintained.

The Rabbit Trick



Probably all of you have at some time in the past seen a magician do the trick. Things appear from the hat seemingly from nowhere. A similar trick can be done with magnetic recording tape. A different sound can be recorded on top of an existing recording without erasing the latter. On reproduction, both recordings can be heard simultaneously. For this effect, some recorders are equipped with a "trick button", which cuts out the erasing head. A special mixer unit is better still. Differing from the trick button, which records the second source of sound after the first has been recorded, the mixer unit enables you to blend in simultaneously two sources, e. g. music and speech. The recording level of each source can also be varied to give preference to either source. This effect is often employed in broadcasting studios; e. g. an announcement of the title of a piece of music is blended in by reducing the volume of the music without cutting it off entirely.

Nature also has its Charm

Battery-operated recorders, with their freedom from the necessity of a mains power supply, are also available for "tape reporters" who record sounds out-of-doors. For those who wish to track down sounds of nature with a normal 'mains' recorder, a vibrator unit can be used that converts the direct current of an automobile battery to alternating current. This vibrator unit is an excellent accessory which enables you to take your 'mains' operated recorder on camping trips or use it as a dictation machine in your car.



Selecting the Proper Microphone

The selection of the microphone should come immediately after that of the recorder. The characteristics of a microphone will be of interest to everyone who does not wish to record programmes exclusively from radio, records etc., but who would like to be the originators of their own recordings. The microphone is the decisive factor for the quality of these recordings. The selection can be made from numerous different types, from the simplest crystal microphone to the top-quality dynamic type. Some of the dynamic micro-

phones are provided with a music-speech crossover switch, others have special characteristics for stereo recordings, and finally those, which have directional characteristics and thus pick up sounds in the area of interest and cut out background noises. For studio application and for high-fidelity recordings of music, condenser microphones have been developed, but these microphones are very expensive and will seldom be considered for use by amateurs. Equipped with the BASF MAGNETIC RECORDING TAPE, a good recorder and a suitable microphone, you are now ready to make



The Recording

The **snake charmer** in India allegedly uses the sounds of a flute to get the snake to dance. Also the recording tape, when unwound from the coiled-up state, becomes alive as it "dances" past the magnetic heads of the recorder. Suddenly it changes from the inactive tape to, say, Beethoven's Fifth, yesterday's dictation, Grandmother reading fairy-tales to the kiddies, etc.

The reels must first be placed on the machine, the full reel on the supply and the empty one on the take-up spindle. With most recorders, the supply reel is on the left and the take-up reel on the right. About 20 inches of tape is unreeled and the free end inserted into the slot of the empty reel. After this, the tape is carefully dropped into the slot of the tape guide of the head unit, and the empty take-up reel

wound two or three times by hand until the switch foil passes on to it; this will prevent any undesirable stops at the beginning of the recording. The leader tape indicates the beginning and the end of the tape. The beginning of Track 1 is indicated by the green leader tape, and that of Track 2 by the red leader tape; in the case of four-track recorders, the beginning of Track 1 and 3 by the green, and 2 and 4 by the red leader tape. Entries of four-track tapes in the Tape Index should read e. g.:—Track No. 1—Start green—Cool Jazz. Track No. 2—Start red—Aida. Track No. 3—Start green—Bach. Track No. 4—Start red—Dictation. Be sure to thread the tape with its coated side facing the heads. With BASF MAGNETIC RECORDING TAPE, the correct side of the tape can readily be distinguished because the uncoated side is printed. If the tape is correctly wound on the reel, the printed markings are visible on the outer layer of the reel.

The adjustment of the proper recording level may be compared to **A Good Dowry**.

There must be nothing missing, but there should not be too much of it. With modern tape recorders, this adjustment can be made without the tape moving. As we have already discussed this process in our booklet under the heading "Tape Recorder", we will just give a short resume:—The segments of the magic eye indicator should not overlap even at the loudest passages, but their deflection should not be too slight, otherwise the recording level is too low and the signal-to-noise ratio will be poorer than necessary. The recordings should be made at a sufficiently high level to ensure that the overall noise introduced by the equipment remains inaudible during the reproduction.

The tape counter must be set at zero at the start of each tape. Where several different selections are recorded on one reel, the indicator reading at the start of each selection should be noted and listed on the index on the side of the swivel case. To find the beginning of any desired selection, set the counter at zero at the beginning of the tape, and run the tape through at high-speed rewind forward until the indicator



reading corresponds to that noted for the particular selection. Make it a habit to let the tape continue on for several seconds with the recording level turned down to minimum after the end of each recording. This is particularly important when making a new recording on a tape that has already been used, as it will erase any existing recording on the used tape and will give you a completely quiet interval between the new recordings.



Turned Over—Just Like New

We have already discussed the two- and four-track methods in detail, and you know that you can use your tape on either two or four tracks. If your recorder does not provide recording and reproduction in both directions of tape travel (most recorders operate in one direction only), you have only to turn over the tape by simply exchanging the now full reel with the one from which the tape has been unreeled. After re-threading the red leader tape, you can continue to record on the second track.

If you have made the recording with a microphone, you might be anxious to hear the results. Let us hope that you will find them satisfactory. If not, you will be no exception. In particular your own voice may sound totally unfamiliar or even objectionable to you. Could it possibly be that the tape does not record sounds true to life?

No, the tape and the equipment is not to blame. People are often horrified to hear their own voices for the first time—as they really sound to others and to the microphone. It is quite different from that which we are used to hearing. When we speak, we not only hear the sound waves created by our vocal chords from the outside but also those that reach our eardrums from the inside of our body. The recording is not faulty, we must simply get used to our own voice as it sounds to other listeners.

But in making a microphone recording, a **Certain Amount of Attention** must be given to Microphone Technique.



The first step is to place the microphone at a proper distance from the speaking voice. A distance of between one to three feet is ideal for average conditions, but if the source moves further away, the ratio of direct sound to its reflections becomes too poor, and objectionable back-ground noises become predominant. You will soon notice that if you touch or move the microphone during recording, the oddest noises will be reproduced when the tape is played back. Every person, and particularly vocalists, must get their own special "feel" for a microphone. This depends on the individual speaker or singer and must be determined by trial. If the voice is extremely soft, the microphone position must be fairly close, i. e. 5—10 inches, but be sure not to place the microphone on the accompanying piano. Positioning of the microphone is of paramount importance whatever you happen to record. The safest method is to make a trial recording first.

Select a quiet room in which you wish to make the recording, and try to keep the external noises out of the room. If there are curtains in the room, they should be drawn. In addition to shutting out external noises, this will also help to dampen any reflections of sounds originating within the room itself. Rugs on the floor of the "recording studio" will likewise have a dampening effect.

The problem of "bad acoustical conditions" are not encountered in outdoor recordings with a portable, battery-powered model. In this case, you actually want the atmosphere and background sounds, such as children at play, motorcar engines and the sound of a waterfall, which you will need for your slides or amateur film shows and which are very difficult to produce indoors.

And for those amateurs who have recorders that are not equipped with a trick button, a small hint:—

Take a collar stiffener, but be sure that it is made of plastic, and place it between the erasing head and the tape before recording the second recording on top of the first. The recording level must be adjusted so that the second source is reproduced slightly louder than the first. Upon completion of this superimposition, be sure to advance the tape without removing the collar stay until the end of the original recording, as otherwise the recording will be erased. An alternative method would be to stop the tape, remove the collar stay, and to switch the recorder to play-back, or better still to advance the tape at high-speed forward rewind. Another valuable aid is a simple strip of paper. If you sandwich this strip of paper between the layers of the wound tape, it considerably simplifies finding a certain spot on the tape, as it comes to the surface when the tape is unwound. This method is so simple, and there are numerous instances where it can be applied.

Tape copying can be accomplished if two separate recorders are available. The second recorder, which is switched to "Record", should either have a slower or the same tape speed as the first. The high-impedance output of the first recorder with the tape to be copied is connected to the input

plugs marked "Gramophone" on the second recorder. Low-capacity, low-loss cables are the best for these connections as they will not reduce the high frequencies. Start the tape to be copied first (with the recorder switched to play back), select its loudest passage and adjust the recording level indicator of the second recorder. Then reel back both tapes to the start. Start the second recorder (switched to "Record") first and then the recorder with the original tape (switched to "Play-Back"), as otherwise you might not quite catch the beginning of the programme. Detailed instructions concerning the best methods of copying tapes are usually supplied with every recorder.



Cutting and Splicing



Not every recording is worth keeping, or you may find that some programme requires a bit of editing. Of course, editing is only possible with tapes that have been recorded one track only, or with those that happen to have a pause on

the other track just at the spot to be cut out. If not, you will cut out and destroy a section of the second track. Splices can be made either by the wet or by the dry method. The dry method with BASF Splicing Tape is most popular. The BASF Splicing Tape Set is supplied with detailed instructions for the dry method. Tape splicing is still simpler with the BASF Tape Cutter Box. It contains all necessary accessories, and above all the semi-automatic tape splicer, which makes clean cuts and produces perfect splices. It positions the ends of the tape to facilitate accurate placing of the splicing tape. This semi-automatic tape splicer can also be employed for the wet method using BASF Adhesive LG. The wet method produces extremely durable splices.

What could be the Cause?

Sometimes results do not quite live up to our expectations. The quality of the reproduction does not seem to be as good as it could be. The cause is not always a defective recorder or recording tape. Usually it is the fault of the operator. Tapes are often placed in the recorder with the oxide away from the head, so that the coated side does not come in contact with the heads; wrong tape speeds are selected; the recording level has been adjusted too low; or a faulty connection was made to the radio set. These mistakes are regrettable but not too serious, as mechanical damage will not result from them. But a more serious mistake

would be to close the cover of the recorder while it is in operation, because this might cause permanent damage to the tape. The heat developed by the motor and the amplifier could raise the temperature in the set to over 160° F (70° C), which no tape can withstand.

Dust and dirt are also bad for the tape, particularly if it is to be employed for four-track recordings. The tapes should always be stored in a bag made of ®LUPOLEN—a BASF polyethylene product—and then placed in the swivel case.

Clean tapes will never start to "flutter".

Although rather uncommon, there are some faults that can be attributed to the equipment. A few of the mechanical and electrical deficiencies are listed with generalized suggestions indicating probable causes.

Inadequate Erasing

One of the main causes of this could be faulty lateral alignment of the heads, i. e. the erasing track does not fully cover the recording track. It could also be caused by faulty tape-guides, insufficient contact between the tape and the erasing head, a weak and defective oscillator valve, or an open or short-circuited erase head.

Two Tracks Blend into Each Other (Cross Talk)

This is the result of incorrect positioning of the heads or faulty tape-guides which cause the tape to move up and down when passing the heads.

Over-Stretched Tapes

A result of incorrect functioning of the tape transport, or a faulty brake.

Wow and Flutter

These objectionable variations in sound pitch are an audible sign of malfunctions in the tape transport mechanism. They are most commonly caused by eccentricities or contaminations of the capstan by dirt or oxide, inadequate pressure of the rubber rollers, or excessively high clutch friction of the supply reel shaft.

Chirping and Squealing Sounds

These are caused by tape vibrations resulting from defective pressure pads. The felt on these pads should be replaced.

Excessive Head Wear

This can result if the tape tension is excessively high. Tapes of poor quality have an abrasive surface which is also conducive to head wear. BASF MAGNETIC RECORDING TAPE has a specially polished surface. Consequently, the frictional drag is exceptionally low, and minimum head wear is guaranteed.

Tape Spillage or Poor Take-Up

Bad spooling of the tape on the take-up reel may be caused by incorrect adjustment of either the clutches or the brakes. Tape spillage usually results from incorrect synchronization between take-up and supply reel brakes. Under these conditions, the supply reel continues to feed tape after the take-up reel has stopped. As a provisional measure to avoid tape spillage, the tape must be kept taut by using the hand as as brake on the supply reel.

Erratic Response

This malfunction is also caused by incorrect tape tension. Inadequate tension results in the loss of intimate contact between the tape and the heads.

Poor High-Frequency Response

A complete loss of high frequencies is most often caused by a worn head. The metal of the pole-piece has worn away to enlarge the head gap. Such worn heads must be replaced. If this loss becomes apparent with only old recordings, or with those made on different recorders, it may be the result of a faulty vertical alignment of the head gap. The adept recordist can align the tape himself, using BASF Head Alignment Tape.

The Maid has nothing to do



If you should be in the envious position of employing a maid, it is best if you do not let her handle such a valuable piece of equipment. In any case, the recorder requires very little maintenance. However, the heads should be cleaned at regular intervals, because contamination of these will result in distortion or dull recordings. From time to time, all tape guides and the capstan should also be cleaned. A soft piece of cloth which has been dipped into methylated spirits is used to clean all areas of tape contact. But remember, these parts should never be scraped with any metallic or hard objects. If you have inadvertently placed a magnetized screw-driver or some other tool on the heads or tape guides, they must be demagnetized. These demagnetizers can be purchased at most dealers of electronic equipment.



Dry or Wet?

The tapes must also be cleaned from time to time. It is practically impossible to prevent dust and dirt from settling on the tape surface. During operation, these dust particles are deposited on to the heads. The resulting reproduction is not only distorted and lacking in brilliance, but the dust between the head and the tape acts as an abrasive. Tapes can be cleaned either by the wet or the dry method. Use a soft blotting or filter paper which has been folded several times or, better still, a wad of cotton-wool. While the tape is running at high-speed rewind, sandwich it between the cotton-wool so that both surfaces of the tape pass through the wadding. Be sure to guide the tape properly and do not let the edges scrape against the flanges of the reel.

For heavily contaminated tapes, the wet cleaning method employing a wadding moistened with methylated spirits is more appropriate. If possible, let the tape run through the moist wadding first and then through a dry wadding. If the space available between the tape guides is not adequate for this double cleansing operation, apply the moistened wadding while the tape is being wound in one direction and apply the dry while it is being wound back. This last method will compensate the tight winding resulting from the drag exerted on the tape by the moistened piece of cotton-wool. Now we are ready to mention a few of the many applications when using recording tape.

A Wide Field

The many possible applications of magnetic recording tape are so numerous that it is impossible to list them in this short booklet. Originally, magnetic recording tape was used only as a recording medium in broadcasting studios. With the development of home tape recorders, an entirely new hobby was born. Then, the business world discovered the immense possibilities of the tapes. And now, it has become an indispensable aid in the field of engineering, science, research, etc. New fields of application are being discovered every day.

In the following paragraphs, we will give you a general outline of the various possibilities and some useful hints that may serve as a guide.

At Home

Home concerts are very popular even today. Private performances and those of your friends can now be recorded permanently. The magnetic recording tape is also an unprejudiced critic and could never be insulting. It will always give an accurate and completely unbiased account of the recital. Arguments as to who was out of tune in the quartet will be settled immediately. And, if a member of the home orchestra is not present, the tape will readily take his place, e. g. at a rehearsal of a violin sonata, the tape can supply the piano accompaniment.





Jazz fans discovered tape long ago. Taped "Jazz-Sessions" are a great fad at their parties. Taped sessions will never be dull as the recordings of their own group are much more attractive than the perfectly recorded performances of professional musicians. It is also an open secret that magnetic recording tape, being an impartial judge and critic, is an excellent aid to perfecting jazz techniques.

Sound-on-Sound Recording

A one-man duet on tape is also an interesting trick. This can be done either with two recorders and a mixer or with a four-track recorder featuring the "Multiplay Technique", which is a new method of superimposing one voice on top of the other. All details concerning the technique are described in the instruction sheets supplied with such recorders.

A set of earphones is naturally indispensable. Of course, this multiplay technique can be employed for the double recording of other sources as well, say, one vocal or instrumental part on a pre-recorded instrumental accompaniment. In every case, the results obtained are quite amazing. If you wish to produce such sound-on-sound recordings employing two separate recorders, copy the



play-back of the first recorder on to the second recorder with a mixer and add the microphone recording while listening to the play-back over the monitoring earphones. The multiplay technique of modern four-track recorders is practically the same as the process already described. The original accompaniment track is recorded on Track No. 1, and the tape re-wound to the starting position. Track No. 1 is played back over the earphones and the vocal or instrumental solo parts superimposed on Track No. 3 synchronously. This



method has the advantage that the tracks can be erased independently, and the recording repeated as often as desired. For adding sound to amateur film or slides, the text, back-ground music, and sound effects can be separately recorded on the two tracks and played back simultaneously. **Family Events.** The tape recorder is gradually becoming as popular as photo-albums or amateur films in our homes. The first attempts of a baby to talk, the first day at school, holy communions and confirmations, birthday parties, wedding services,—life is full of such sounds that increase in value as time goes by.

Club Activities. On tape, the meetings seem much livelier (and candid) than on paper. The club secretary's work is greatly simplified. The speech of the president and the atmosphere of foundation ceremonies can be recorded for all future members.



Tape Correspondence. Once you have tried this new method of communicating with your friends, you will find that it is a lot of fun as well as time-saving. How long does it take us to write, and how long to speak the same words, particularly if it happens to be a seven-page letter? Such spoken letters, in which the children or the wife can add their greetings, will convey the atmosphere and the "presence" of the house; with its background noises, such as the barking of your pet, the tune that you wish your friend to hear, or even Junior's singing in the bath-tub. Wouldn't your friend feel as if he were right in your living-room?

©PIKKOLO Tapes, packed in their handy postage boxes are most suitable for talking letters. Larger tapes can be mailed as samples, but such shipments must comply with local postage regulations. Do not forget to attach a slip showing the recording speed. If the recipient has a four-track recorder, he can play back your two-track recordings without trouble, but if he has a two-track recorder and your tape has been recorded on a four-track system, be sure to use new tapes or those which have been bulk erased. Another point to remember is that you must record on track No. 1 and No. 4 only, as otherwise he will hear two recordings when he plays back your four-track tape on his two-track recorder. A certain amount of loss in quality would have to be expected in the latter case.

Do not forget to record the full name and address of your friend at the start of the talking letter, so as to ensure that the postal authorities can readily determine the addressee if the tape has fallen out of the container.

Reporting on Location. Any amateur recordist can become a radio reporter. True-to-life reports of foreign countries and their peoples, trips abroad, or important events increase in their value with the passing of years. Portable recorders with self-contained power supplies are best suited for this application, particularly those amateur reporters who like to climb up trees for they will find these recorders very handy. Normal home recorders can also be used, but these a. c. recorders require a vibrator or converter unit if they are to be operated from a car battery. Even the best sound effects produced in sound studios cannot quite match the realism of the true "on-the-spot" recording with its genuine back-ground sounds. Another advantage is that troublesome sound reflections can hardly occur out of doors.



Dramatic Programme on Tape. This is the most advanced and enjoyable form of recording. In the production of dramatic programmes, you can be the author, director, co-director, speaker, and sound engineer all in one person, or you can form a team together with your friends. It will be difficult to produce a good programme without a script and a good story. Script writers know that the text should not sound too "literary", otherwise the actors will sound as if they were reading a book. The script should also contain notes indicating where the sound effects and back-ground music are to be superimposed, and it should be sub-divided into scenes. Each scene should be "shot" separately. List the pages of the script under the following designations:—Scene number, Speakers, Sound effects, Back-ground music, Explanations, Number of the tape counter, and Playing time. The importance of adding sound effects in the recording cannot be sufficiently emphasized. In no other manner can you give the scenes a realism, create the mood, and provide an illusion of depth. It is sometimes possible to record these sound effects out of doors, but they can also be simply "created" in the recording studio. The following is a "cook-book of sound effects" listing the main ingredients.



Rain



Take 15—20 dried peas and let them roll back and forth over a fine-meshed wire sieve. The best position for the microphone is immediately beneath the sieve.

Wind

Pull a piece of silk across two or three soft wooden boards. The strength of the wind can be adjusted by increasing or decreasing the drag.

Thunder



Either shake a large, thin sheet of metal quite close to the microphone or record chords struck on a piano and play back at half speed. Another method is to blow into the microphone, but this has to be tried first.

Waves

Waves can be reproduced quite naturally:— Agitate the surface of the water in a plastic pail and record the sound of water lapping against the sides.



Breakers

Take two brushes and move them across a long sheet of metal in opposite directions.

Fire



For a warm, sizzling, open fire-place:— Crush a match-box about two or three inches from the microphone. For leaping flames:—Crush a sheet of cellophane.

Rowing boat



Dip two pieces of wood rythmically into the water and let a rusty hinge squeak in unison.

Steamer



To imitate a fog-horn, blow across the neck of a bottle half filled with water. The less water the bottle contains, the deeper the sound.

Locomotive



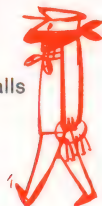
Take two wooden blocks covered with sand-paper and rub them against one another.



Hoof-Beats

Take two halves of a coconut shell and strike them together. If you cover them with a piece of cloth you can imitate the hoof-beats in a forest or on a pasture.

Footfalls



In the forest: A handful of old magnetic recording tape is crushed rythmically in front of the microphone. In the snow: Do the same with a small bag of flour.



Skis

Pull a small piece of wood across a rug or thick blanket, once nearer to and once farther away from the microphone.

Jet Aeroplane



Run an electric hair drier near the microphone and let it howl by restricting the exhaust.



Pistol Shot

Strike the table close to the microphone with a ruler.

A Voice on the Telephone



Speak into a plastic or small earthen ware cup. Some microphones are also provided with a switch to imitate this effect. You may also know that an especially talkative person is produced by running the tape at twice the normal speed. Such gimmicks of the cabaret stage are always useful.

We would also like to mention at this point that another source of sound effects is the gramophone record or pre-recorded tapes which contain many sound effects ranging from birds to locomotives.



But now let us discuss some more useful hints on the subject: "Magnetic Recording Tapes at Home".

The Acoustic Visitors'-Book. Really a novelty! The voice is just as personal as handwriting where you can't even tell whether it was a male or female guest. The spoken greetings of your guests on tape with the pleasant atmosphere of your party will always remain a source of enjoyment at later gatherings.



The Short-Wave Ham. No need to go into time-consuming descriptions of your partner's signal quality. Simply record his CQ and play it back to him. You may also wish to keep some transmissions as future reference, or if a part of the message could not be completely understood, it can be repeated until it has been clarified.

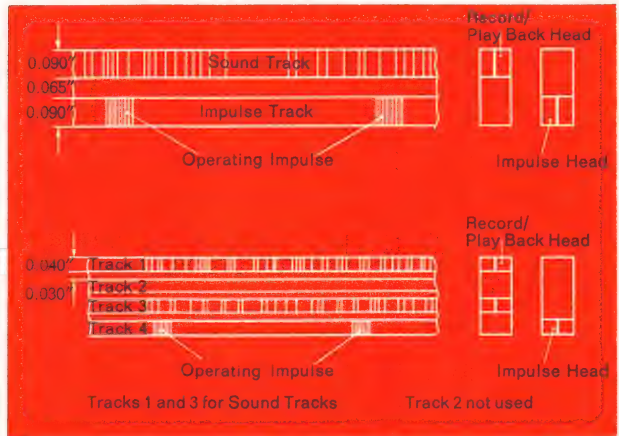


Adding Sound to Slides. Adding sound to slides seems to have become one of the most popular pastimes with magnetic recording tape users. Or don't you take any pictures, or project slides? If you are an amateur photographer and show your slides to your friends, has it never occurred to you after the presentation that you had not meant to say: "—and here's Aunt Betty in front of the steamer . . ." (Everyone could see that anyway!) It would have certainly been nicer to tell the amusing anecdote about Auntie's absolute refusal to go aboard! The sound of the harbour, such as the waves lapping against the pier and the fog-horn of the steamers are also missing. Yes, you couldn't tell your friends all the details because you were too busy positioning the next slide into the projector.

You can certainly make your slide presentations more enjoyable with magnetic recording tapes. First of all, sound will add a new dimension to your pictures, and second, the tape will save you the work of changing the slides so that you can be a spectator of your own slide-show. All you have to do is to record the text together with sound effects for the group

of slides you want to project. A pleasant tone, such as a soft tap on an empty wine-glass with a spoon or a pencil, recorded between the commentaries will remind you when to change the picture. If you have a recorder with a self-contained Synchro-Adapter or a small adapter unit, it will save you the work of changing the slides. A signal recorded on the second track will operate the mechanism contained in your automatic projector at the correct moment. If desired, the slides can be changed in the middle of a sentence. This will help to increase the viewers' interest and result in a professional, smooth presentation.

**Operating automatic projectors,
using magnetic impulses
on a 2-track Recorder**



**Using
a 4-track Recorder**

The method is not very difficult. The projector, tape recorder, and synchro-adapter are connected. During the recording of the commentary, a button is depressed at the moment you wish the slide to change. This records a "transport" impulse on the second track, which will activate the slide changing mechanism.

Of course, the text must be written down first, similar to the script of the dramatic programme which we have already

discussed. To produce a more elaborate and more professional form of recorded commentary, you can superimpose a musical back-ground. Although a mixer unit is very handy, you can also employ the trick-button or the collar-stiffener method described earlier in this book. The point at which the back-ground music is to be added can be marked on the back of the tape.

Recording Sound Tracks for Amateur Films. As with slides, sound greatly improves the presentation of your amateur films at home. The principle is the same. Accurate synchronization (lip synchronization) of sound and picture is possible with a sound-on-film adapter. Also in this case, the tape greatly facilitates the process. Run the film and tape over the sound-on-film adapter, first without sound. When the first scene flashes on the screen, tap an empty glass with a pencil, this is recorded on the tape through the microphone. A second tap will mark the end of the scene. After you have gone through the entire film, marking the scenes acoustically on the tape, you can then turn off the projector and work on the tape. Mark the back of the tape where the tones occur and number them. All you have to do now is to align each number marked on the back of the tape with the recording head, and to start recording the text and sound effects for each individual scene. All this work can be done without projecting the film, but remember that you must put a starting mark on the film and tape at the beginning of the timing run to ensure that, say, the telephone does not start ringing after the receiver has been taken off the hook.

If you have an automatic film projector, a switch-foil attached to the back of the tape will start up the projector at the correct time.

The location of the tape recorder is just as important for projecting films as for your slide presentation. The standard rules are:—The recorder with the built in speaker switched off, right beside the projector; an extension speaker placed behind the screen; the sound must be in proper balance with the size of the projected picture. It would also be better if you and your friends did not smoke. In any case, project the film over the heads of your spectators.

And now, we hope that you will have a lot of fun. In any case, a film that you have produced yourself will be much more exciting than the best industrial product that has won many Oscars. Its value will increase with time and will be a constant source of enjoyment for you, your children, and even your grand-children.

We have now reached the stage when we would like to mention some of the commercial applications of magnetic recording tape. Usually it is but a short step forward from an amateur film producer to a professional working for a television studio. Of course, films for a TV studio must be shot on 35 mm or 16 mm black and white film. Many professionals have started out as amateurs and have later turned to commercial. And this is by no means unusual, we normally choose hobbies that fit individual character and qualities. Magnetic recording tape enables us to find hidden talents which we never imagined to possess.



Business and Profession

The modern business world demands a lot of know-how and talents. To be a success, we must be sure of our abilities and possess talents that are not easily attained. What possibilities can a magnetic recording tape offer us in this respect?



As we have already mentioned earlier in this book, it is an unbiased helper and critic in perfecting our abilities. Never in the past have actors, singers, musicians, and speakers had the means to **examine their abilities themselves** as readily as with a tape recorder. At any given time, they can hear their performances as their own audience. The critical evaluation of their shortcomings is completely unbiased and cannot be influenced by the mood or individual taste of another person. For the beginner, the tape enables him to hear and judge his own talent in the field he has chosen. Tape is a particularly valuable helper in studying foreign languages; there is no better way for the student to practice correct pronunciation than by being able to compare his speech directly with that of the instructor. Telephone operators also learn to speak in a clear and accent-free voice with the aid of tape recorders. An accordion instructor has gone a step further: He plays back the taped performance of his students at half-speed.

This shows up all errors as if they were inspected under a magnifying glass. Some artists set up their recorders behind the scenes when they are performing on stage. At home, an evaluation of the applause will indicate any flaws in their programme and will show what points he succeeded in "getting over" and where he has failed.

Dictations on Tape. Many businessmen have found that it is a pleasure to dictate to the tape recorder. It is always available and willing to take dictation even in the middle of the night, moreover, it never makes a mistake. While the secretary types out the first letter, the boss can go on dictating the second.



The complete privacy allows him to concentrate on the subject, and another advantage is that this method saves a great deal of time.

Recording Conferences. The tape can act as the secretary in the recording of important discussions and conferences. Unimportant topics can be readily eliminated when the conference is transcribed later on.

On Business Journeys. Report-writing has always been a nuisance to agents and representatives. As is often the case, top salesmen who are very talented speakers are rather poor report-writers. A quarter-hour report, spoken on tape in a hotel-room before retiring, is certainly more enjoyable. These taped reports can be mailed to the head office and quickly evaluated.





Acoustical Circulars and Directives. This is the opposite of the foregoing paragraph. The head office sends out taped circulars to its representatives in the field. As any desired number of copies can be made from one recording, the text need only be spoken but once.

Training of Salesmen. Effective instruction courses can be given to salesmen through added sound to slide instruction courses. Pictures and sound combine to make an interesting, effective instruction course. Ideal sales talk is more readily remembered if it is conveyed acoustically, and, at the same time, newcomers have a better way of comparing their own efforts with the ideal technique. The circulation of these instruction courses involves no travel expenses and is practically as effective as a course given by the instructor in person.



Advertising. Of course, the tape has not been overlooked by advertising specialists. Tape recorders are used in talking self-service machines that address you with a friendly "Thank you, and come again". Other appliances are also being made to "talk", such as the refrigerator that starts to tell the prospective customer all the advantages and technical details of the new model as soon as the door is opened. The information which can be given to the customer by this method is far more complete than that which a salesman could supply from memory alone. Telephone receivers are also being installed beside shop-windows in order to give a description of the good shown to any shopper who happens to pick up the receiver. Picture shows with added sound in shop-windows never fail to draw a crowd. This possibility enables the dealers to enlarge their window space to unlimited proportions, because it allows them to advertise many more

goods than the space permits when they are presented by the conventional method.



An application of magnetic recording tape, similar to that in the field of advertising, is that of guided tours.

A Guide through a Museum. Details of the works of art exhibited are given to visitors at the touch of a button. Machines that give such information in all the important languages are installed beside the famous "Moses" of Michelangelo in the Roman church San Pietro in Vincoli. In a French art gallery, visitors can listen to the artist's explanation of his own work. The director of a famous zoo conducts his visitors by way of wireless receivers. Of course the explanations were spoken on tape only once.



Teaching by Recording. Schools employ a similar method to enable the student to learn more rapidly. The science-conscious younger generation will follow their lessons with greater attention if they are presented in this modern way. The main application of magnetic recording tape in schools is as a medium for self-instruction. Young students in particular make more rapid progress when they can hear their efforts as others hear them. The student now has at his command a method to improve himself by critically listening to his own recordings. Tape is a valuable aid in the study of foreign languages, particularly if the student has a means of comparing his own work with that of the instructor and for the purpose of self-evaluation. The song of birds and cries of animals are reproduced in the class-room; folk-songs of foreign countries, their dialects, descriptions of countries and their customs help to liven up the geography class. Another great educational potential of tape is that of presenting slide shows with added sound and synchronized film in class-rooms. Tape has also a valuable application in vocational schools. Automobile mechanics are trained to distinguish engine defects by listening to their sounds. Tape has become a great blessing particularly in institutes for the deaf and dumb. Complete

deafness is rather unusual and most deaf-mutes have some ability to distinguish sounds. Some characteristic sounds of the acoustical world are first recorded and arranged in a definite sequence. This recording is amplified and then reproduced. Later on the sequence of the sounds are changed, until the students can clearly separate one sound from another. Their own efforts to speak are also recorded, amplified, and reproduced. The children, thus, have the chance to hear themselves for the first time, to understand their own speech, and to improve their efforts by means of comparison. Anyone who has had a chance to observe their pitiful attempts and their excitement when able to experience a small part of our acoustic world will understand the meaning of the phrase: "Blessing of Science".

In zoology, tape is employed to record "inaudible" sounds. Sounds of animals, inaudible to the human ear, are recorded on tape at high speed, and made audible to the human ear by reducing the tape speed on play-back, which in turn, reduces the ultrasonic sound-waves to those audible to the human ear. **In universities**, students have tried to replace their lecture notebooks with tape recorders. In the University of Perugia, for instance, students are reported to have set up their recorders at the beginning of the lecture and later on to have returned to collect the recording. Although this method may appear rather impersonal at first glance, it will be understood if one considers the overcrowded lecture halls of present-day universities. The space required for a tape recorder bears no relation to that required by one person. Passages that are difficult to understand can be repeated as often as desired. Last but not least, this method allows the student to hear a lecture which he could not attend, because two lectures were



being given at the same time. However, prior to making a practice of this, the student must request permission from the professor.

In this case also, the great advantage of magnetic recording is its accuracy and ability to prevent misunderstandings.

Telephone Conversations. Such recordings, made with the permission of both parties, enable an accurate record of



difficult orders to be made, dictation over the telephone, etc. A large electrical wholesaler in London accepts orders over the telephone by this method. Customers from any part of England can place their orders at any time of the day or night and the wholesaler need not pay an employee for overtime work. Another application similar to this is the telephone answering device.

Automatic Telephone Answering Device. This device answers all incoming calls with the voice of the owner saying: "I am sorry, but I'm not at home. This is a tape recording. Please dictate the message after the next tone . . .". Of course, the text can be changed to fit any occasion. Some automatic answering units that can be connected to home tape recorders are also available.

At the Inventory. Making hand-written lists at inventories have now become unnecessary. The stock can be registered on tape while you are walking along the shelves and counting the



items out aloud into the microphone. The recorded inventory can be typed out by a secretary later.

In the Elevator. The tape can take the place of lift-operators. The announcement: "Third floor. Household goods and toys . . ." will be spoken by the "mechanical" lift-boys. The same department store may supply pleasant **back-ground music** in their sales-rooms. Tourist groups listen to recorded music in railway carriages, and guests of many modern hotels are supplied with music recorded on tape in their hotel-rooms.

At Fairs and Exhibitions. Polyglot recordings are employed to describe an exhibit in many different languages. At an industrial fair, a step-by-step explanation of the production line can be given to foreign visitors in their mother tongue.





A comfortable way to follow the programme of the exhibition is by being seated in easy-chairs equipped with loudspeakers that whisper the commentary into your ears.

Ideas. Authors, composers, and managers have found tape to be a valuable helper in making notes of their ideas and reflections. (This policeman must still use his note-book.) But many a station master could go on having his tea if he were permitted to let the tape do the announcing of incoming and outgoing trains.

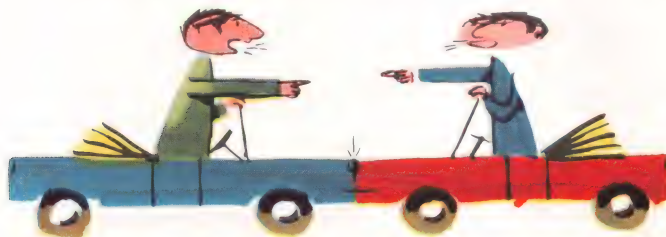


In Telephone Exchanges. The numerous applications of magnetic recording tapes have increased to such an extent that it is hardly possible to list every possibility in this small booklet. The weather forecast, suggestions for the evening menu, the programme of the theatres, films, sports events, time-signals, etc., most of these services are given on tape. In London, the telephone service will inform you of the time of the next changing of the Guard.



Air Traffic Control. Tape not only gives information on the Changing of the Guard, but it actually takes the place of a "guard" in air traffic control. Tape recorders are in operation day and night in order to record the conversation of pilots with ground-control. An evaluation of such tapes often determines the cause of air-traffic disasters and assists in discovering measures to prevent similar accidents.

In Morse-Code Practising. A novice "ham" operator employs the different speeds of the tape recorder, in order to facilitate the



transcription of a message which he can play back at half-speed.

In Traffic Accidents. If the police record the statements of witnesses immediately after the accident, mistakes in recapitulating the incident at some later date can be avoided.



In the Medical Profession. Tapes can often take the place of a nurse. The findings of an X-Ray examination can be dictated right in the darkened room. Recordings of heart-beats or the respiratory system can be made for comparison purposes in determining the symptoms. Psychiatrists and psychologists record conversations with their patients for evaluation at a later time.

Dialect Research Work. This is not just a cheerful recording of interesting dialects. It is a science from which much knowledge may be derived. Several institutes have been established in Germany in order to record the various dialects, particularly those spoken by refugees. These recordings are then evaluated to determine the degree of change that the language has undergone with the passing of time.

Talking Books and Weeklies. International literary works, as well as magazines and periodicals, are recorded on tape and rented out to associations serving the blind. It is certainly more pleasant for the blind to listen than to feel over the pages of books printed in the braille. Tapes not only serve the blind but also professional men who are always pressed for time, such as the doctor who cannot possibly find the time to read every publication in the field of medicine, he finds recorded scientific articles to be of great assistance. Doctors can now listen to lectures on new theories while they are occupied with routine work.



The Theatre. The stage has always cultivated art based on illusions. In the past, thunder was produced by striking a large metal sheet back-stage. Now, this is done with the tape recorder. Few actors have developed additional talents apart from singing—e. g. playing an instrument. The beautiful melody does not originate from the violin that they are playing on stage.



Contrary to the stage, reality and actuality are expected from an **Expedition**. Pagan ceremonies, music, song, and the dialects of foreign peoples, or the cries of unusual animals, are the special "loot" of an expedition. Scientists, film-producers, and broadcasting studios employ such recordings brought back by expeditions.

The Role of Tape in Scientific Research and Engineering

Magnetic recording tape serves mankind as a new, valuable tool in the field of science and engineering. Here, it does not record audible sounds, but inaudible electrical impulses that are fed into electronic robots to control large-scale automatic production lines, but tapes can also operate lathes and small machines individually.

The rapid advancement of tape recording has now given birth to a new era, that of magnetic photography. Tapes "photograph" the beam of the cathode-ray tube (TV-picture tube) by recording the variations of electrical current and voltages and converting these into magnetic fields of varying intensity. Both picture and sound can now be recorded on tape and reproduced with the same clarity as the original. No time-consuming developing processes are necessary. Having found so many applications of magnetic recording tape on earth, further uses may perhaps be found in space only. The numerous satellites circulating the earth collect scientific data as electrical impulses on tape and transmit this recorded information at an enormous tape speed to the



receiving station on the earth. Thus, the little, brown tape which was invented as a result of man's dream to captivate a fleeting sensation has helped in fulfilling an even greater yearning of man:—to explore the universe.

We, however, are glad to be able to live in an environment in which we feel ourselves at home:—in our own four walls. And we are happy that we can use our BASF MAGNETIC RECORDING TAPE there. We therefore feel that we should give you, in closing, a few details on how to keep your tapes in perfect condition for all time.

The BASF Magnetic Recording Tape Index

*) This storage box is constructed of impact-resistant Polystyrol produced by the BASF.

Some type of a tape filing system is indispensable. One recording will follow another and soon you will have a large number of tapes, properly filed and numbered, in your book-case. Filing is greatly facilitated if BASF MAGNETIC RECORDING TAPES are purchased in the BASF Tape Storage Box. *) (We have already discussed in great detail why tapes should never be left lying about and should always be placed in the LUPOLEN bag and then packed into the swivel box. We have furthermore discussed what effects dust particles have, particularly when they are to be used on four-track recorders.) Storage at normal room-temperature is best. File the tapes in the book-case or on a book-shelf, but never leave them on top of the radiator or in the kitchen. All information

should be written on the side of the tape-box which swings out of the swivel case. A master catalogue is set up in the BASF Magnetic Recording Tape Index, which was designed for this specific purpose. We would also suggest that you mark the leader tape with the same index number as that of the swivel case. In this way, you will avoid all errors in replacing the tape.

Six Commandments for the Amateur Recordist

1. Never run the tape in a covered recorder.
2. Never use force when you are handling the recorder or the tape.
3. Always ensure that the tape is threaded properly. The coated side must face the heads, and the printed back of the tape must be visible from the outside.
4. Always keep a tape (a small one will also do) threaded in the recorder and ready for immediate operation.
5. Set up a clear and orderly file. Your new hobby will then give you much more pleasure.
6. Tapes that are not in use at the moment belong in bags made of dust-proof ®LUPOLEN—a BASF polyethylene product—and should be protected in the Swivel Case or BASF Tape Storage Box.

Books on Tape Recording available in English Language

Periodicals:

Amateur Tape Recording and Hi-Fi Magazine
Hi-Fi News
Tape Recording Magazine
The Tape Recorder

Some other books of interest:

- "Tape Recording for Everyone"—F. C. Judd
Publisher: Blackie & Son
- "Tape Recorder Manual"—W. S. Sharp
Publisher: Fountain Press
- "Tape Recording & Hi-Fi"—Douglas Brown
Publisher: Arco Publications
- "Tape Recording as a Pastime"—Douglas Gardner & Ian Arnison
Publisher: Souvenir Press
- "Introduction to the Tape Recorder"—Charles Langton
Publisher: Tape Recording Magazine
- "Advice on Buying a Tape Recorder"—J. F. Ling
Publisher: Tape Recording Magazine
- "How to Record Weddings"—Paul Addinsell
Publisher: Tape Recording Magazine
- "Tape and Cine"—John Aldred
Publisher: Tape Recording Magazine
- "Hi-Fi for the Music Lover"—Edward Greenfield
Publisher: Tape Recording Magazine
- "How to get the best out of your Tape Recorder"—Percival J. Guy
Publisher: Norman Price Limited

Reference for Schools and Amateur Film Clubs

The film "The Magic Tape", produced by BASF Ludwigshafen, shows an exceptionally clear and vivid way of the developments of Magnetic Tape and its diverse field of applications.

The film, of international achievement, has received not only the documentary award of the Ministry of Interior, but also the Federal German Award for 1960 as the best German documentary. At several international film festivals "The Magic Tape" was rewarded with first prizes and high awards.

Copies of this film are available as a colour film, with optical sound track, 16 mm, running time approximately 28 minutes. Available in the following languages: German, English, French, Spanish and Italian.

In case you are interested in having "The Magic Tape" on loan, please contact BASF Chemicals Limited, of 5a Gillespie Road, London, N.5., or the distributor in your country, when they can supply you with the film catalogue, which includes further interesting films by BASF.

BASF News Letter

The BASF News Letter, which is an interesting booklet published four times per year, is available to all tape enthusiasts. It is only necessary for you to send your name and address on a post card asking to be placed on the mailing list, and this will ensure that you will receive a free copy of each publication.

If you are interested in this publication, which contains many interesting articles from all over the world, then please apply to BASF Chemicals Limited, 5a Gillespie Road, London, N.5., or to your nearest BASF Distributor.

Space for personal entries in the hobby of Recording Tape

MAURICE CHAPMAN & COMPANY PTY. LIMITED

31 MacQuarie Place, Sydney (Australia)

Telephone 27 6857

Badische Anilin- & Soda-Fabrik AG

L U D W I G S H A F E N A M R H E I N

WESTERN GERMANY



BASF

MAGNETIC RECORDING TAPE



Product Pamphlet

| | Type | Spool ϕ inches | Length feet | Playing-time per track at 9,5cm/s = 3¾ips. min |
|------------------------------------------------------------------------------------------------------|-----------------------------------------------|-----------------------------|-----------------------------------------|---------------------------------------------------------|
| Ideal heavy-duty tape for home, professional, school and office use, for full and 2-track recorders. | LGS 52 Standard Tape (PVC) | 5" 5¾" 7" | 600' 900' 1200' | 30 45 60 |
| Universal all purpose tape, strong and yet flexible, also suitable for 4-track recorders. | LGS 35 Long Play Tape (PVC) | 3" 4" 5" 5¾" 7" | 210' 450' 900' 1200' 1800' | 11 22 45 60 90 |
| Due to highest possible flexibility ideal for 4-track recorders. | LGS 26 Double Play Tape (PVC) | 3" 4" 5" 5¾" 7" | 300' 600' 1200' 1800' 2400' | 15 30 60 90 120 |

BASF Tape Library Box

(durable polystyrol plastic)

Available for spool ϕ

3", 4", 4 1/4", 5", 5 3/4" and 7"

containing long play and double
play tapes.

For details please ask your dealer.



BASF Cutter Box

a comprehensive tape editing kit containing:

1 semi-automatic tape splicer

1 splicing tape 0.7" x 33'

3 leader tapes, 80' long,

one green, one red and one white

50 switch foils, each 6" long

4 tape clips

50 spool labels, 25 green and 25 red



Accessories for BASF MAGNETIC RECORDING TAPE

Empty spools

Empty cardboard swivel boxes

BASF tape clips

Non magnetic scissors

straight or curved

BASF splicing tape set

BASF splicing tape

$\frac{1}{4}$ " x 33'

BASF adhesive LG

25 g (0.9 oz) in glass bottle

Cutter Box refills:

BASF leader tape

80' long

green, red, white, yellow, blue or grey

BASF switch foil

packages of 50 strips, each 6" long

BASF splicing tape

0.7" x 33'

| | Type | Spool Ø inches | Length feet | Playing-time per track at 9,5cm/s = 3¾ ips. min |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------|--------------------------------|----------------------------------------------------------|
| Thinnest tape specially suited for battery operated recorders. | PES 18 Triple Play Tape (Polyester) | 3" 4" 4¼" 5" | 450' 900' 1200' 1800' | 22 45 60 90 |
| Special features: All tapes with leader tape and foil for automatic switch at both ends. Equipped with useful tape clip. Sealed in plastic bag against dust and contained in a handy swivel box. | | | | |

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Badische Anilin- & Soda-Fabrik AG

6700 Ludwigshafen am Rhein

Western Germany

**Helpful
technical
data
on
various
types
of**






BASF

MAGNETIC RECORDING TAPE

Helpful technical data on various types of

BASF

MAGNETIC RECORDING TAPE

| Data | LGS 52 | LGS 35 | LGS 26 |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|--------------------------------------------------------------------------------|
|  Mechanical properties Type of tape Base foil Tape width (inches) Base thickness (mils) Coating thickness (mils) Permissible dynamic load ¹⁾ (lbs) | Standard PVC 0.246±0.002 approx. 1.5 approx. 0.5 approx. 5.5 | Longplay PVC 0.246±0.002 approx. 1.0 approx. 0.5 approx. 3.8 | Doubleplay PVC 0.246±0.002 approx. 0.75 approx. 0.4 approx. 2.7 |
|  Magnetic properties Intrinsic coercive force (Oe) Retentivity (Gauss) Relative remanence (%) | 290 850 75 | 290 850 75 | 290 850 75 |
|  Electro-acoustical properties (measurement under normal conditions on home recorders) Sensitivity ²⁾ (dB) Frequency response ²⁾ (dB) Tape flux at 5% harmonic distortion (mM) Signal reduction by erasing (dB) Print-through = signal to transfer ratio (dB) | + 1.5 + 0.5 550 > 70 > 58 | + 1.5 + 1 550 > 70 > 55 | + 1.5 + 2 400 > 70 > 53 |

¹⁾ = for a plastic elongation of ≤ 0.1 %

²⁾ = in relation to the unrecorded section of DIN (German standard) calibration tape 9 (3¼ ips)

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